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CHARCOAL BRIQUETTES

A Manufacturing Opportunity In Georgia

Prepared for
The Georgia Department of Commerce
Scott Candler, Secretary

by
Robert E. Van Geuns

Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia

C H A R C O A L B R I Q U E T T E S

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PREFACE

This report draws attention to the possibilities for profitable charcoal briquette manufacture in Georgia. So far not much charcoaling is done here, which is surprising for a state with such important forest resources. It is true that the production of charcoal as such is not a growing industry. However, the production of charcoal briquettes for barbecuing is growing fast. Several neighboring states already have briquetting plants. If a plant is not installed in Georgia soon, the State may well lose a manufacturing opportunity.

No regional market data were available to serve as a basis for this study. The magnitude of the project does not warrant a comprehensive, detailed market survey. Nevertheless, in order to have an idea of the order of magnitude of briquette consumption in Georgia and five neighboring states the sales in a number of towns in this area were determined. These sales figures were used as a basis for the estimation of annual per capita consumption. The figures obtained in this way are, of course, only approximate, but they are sufficient for the purposes of this study. They check closely with figures obtained from a local charcoal distributor.

This report would never have come into being without the help of many individuals who gave freely of their time, permitted us to profit from their seasoned judgment, and supplied factual information. This includes many charcoal and briquette dealers, wholesalers, supermarket officials, storekeepers and others. It is not possible to list all their names.

However, we want to single out Mr. Joseph E. Kling, who assisted in collecting market data, Mr. Ralph Peter, of the Athens-Macon Research Center of the Southeastern Experiment Station at Athens, Georgia, who supplied valuable information on charcoaling and Georgia charcoalers, and Mr. John R. Peterson for his encouragement to undertake this study. Dr. Ernst W. Swanson and Dr. Kenneth C. Wagner read the manuscript and furnished valuable suggestions. The editing and preparation of the manuscript were under the supervision of Mr. Robert Bullock and Mrs. Annie F. Edwards.

INTRODUCTION

Georgia has approximately 64 per cent of its surface covered by forests. The hardwoods or broadleaf trees occupy roughly 27 per cent. Part of these hardwoods are classified as cull trees, which means that they are not saleable for saw logs. In other words, they are of no interest to furniture or plywood manufacturers and cannot be used for construction purposes.

Charcoaling is an industry which can use almost any kind of hardwood. To be profitable, however, it needs cheap raw material. Charcoaling is not an expanding industry, but production of charcoal briquettes for the domestic market very definitely is. The production of charcoal briquettes is definitely an interesting possibility for Georgia.

A good source of cheap raw materials would be wood residues like trimming and slabs from lumber mills and other woodworking industries. This material is available at very low cost in the Southeast. A survey which is being carried out by the Georgia Forestry Commission and the Southeastern Forest Experiment Station will soon indicate specific locations at which these residues will be most plentiful.

Another cheap raw material will be the hardwood cull trees mentioned above. The pulpmakers' suppliers want to get rid of these culls in order to replace them with pines. This makes it likely that they could work out an arrangement with charcoalers to supply them with the low-quality hardwood at low cost. In this way charcoaling and briquetting operations would upgrade an otherwise almost worthless material.

SUMMARY

The production of charcoal briquettes for the domestic market is a rapidly expanding industry. A market survey completed for this study indicated that the per capita consumption in six states, Alabama, Florida, Georgia, North Carolina, South Carolina, and Tennessee, was about two pounds in 1957. This gives a total consumption for the six states of 19,500 tons. The increase in consumption for 1958 will probably be about 3,900 tons. Since there are five briquetters in this area, a Georgia producer could reasonably aim at a production of about 4,000 tons per year. An aggressive firm could likely sell more.

The briquetting operation would require a capital investment of about $110,000 and working capital of $80,000. Return on fixed investment would be approximately 60 per cent; on the total investment it would be about 35 per cent before taxes. The charcoaling operation would require an investment of about $50,000 and give a return of 15 per cent. The briquetting and charcoaling operations together would employ about 26 persons at a total payroll of approximately $102,500.

Charcoal briquettes are sold in 5, 10, and 20 or 25-pound bags, the 10-pound bags being the preferred size. At present, the supermarkets are the largest outlet, accounting for about 60 to 65 per cent of total sales. Other important outlets are fuel dealers and some of the Ford Motor Company's dealers.

Total charcoal production in Georgia is estimated at between six and seven tons a day. This is insufficient for a briquetting plant of the size indicated by the study. There is, therefore, room in Georgia for more charcoal production as well as for a briquette plant.

Once a properly run, medium-sized charcoaling operation is established, it could become quite important to a carbon disulfide manufacturer. The latter uses large quantities of charcoal and would only be interested in a reliable supplier with a substantial capacity. Carbon disulfide is a raw material for viscose rayon manufacture--a possible industry in Georgia.

The briquetting operation could probably best be carried out by a company with a national market and experience in the field. Counties which desire to attract a briquetting plant should try to establish contact with such a company, preferably one which sells here but does not have

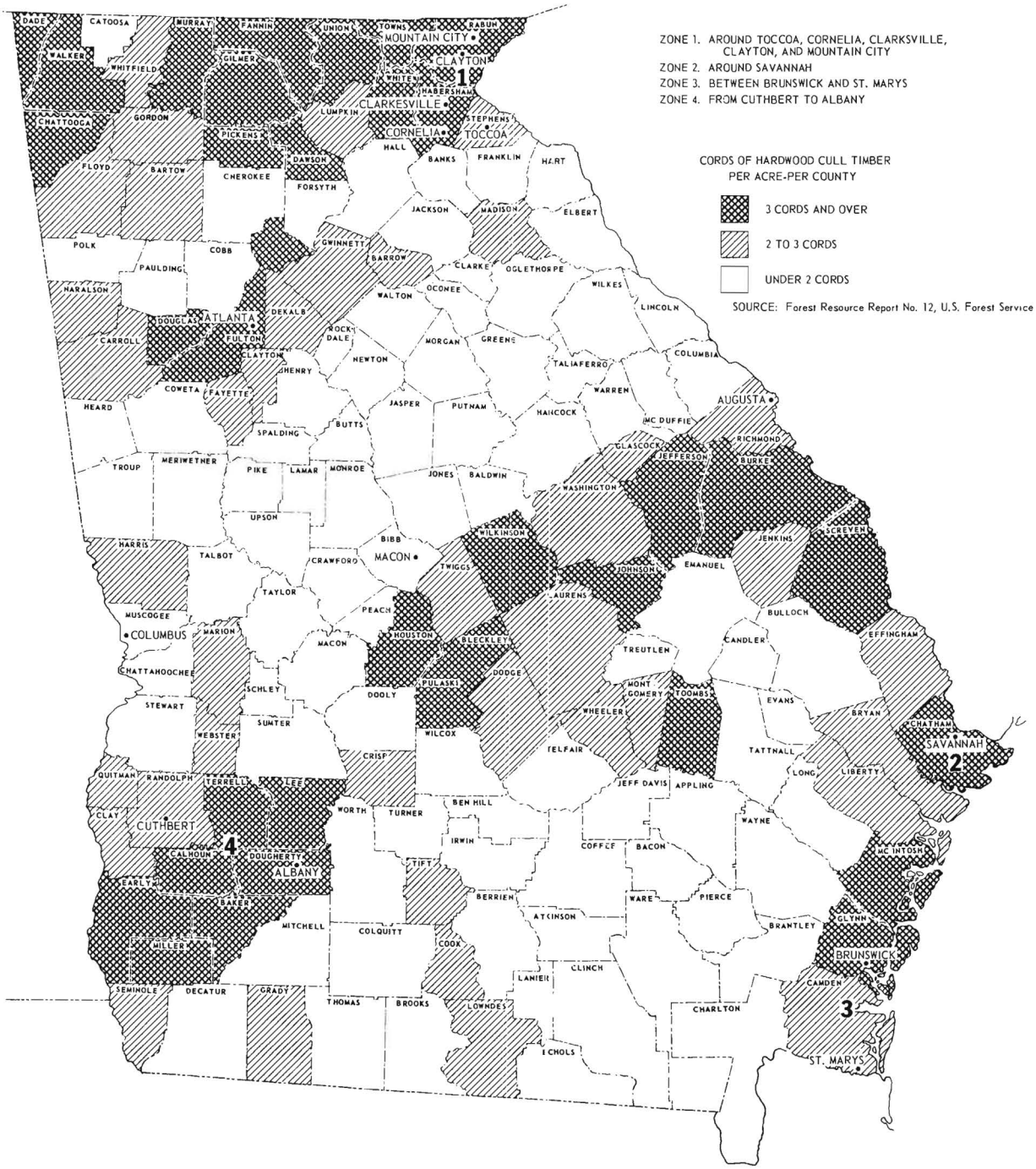
a manufacturing plant in the Southeast. The Kingsford Company would, for example, be a good prospect. Their product has found good acceptance in the Southeast, the major factor limiting sales being high transportation costs from their Michigan plant.

The possible use of mill or woodworking residues as a raw material source for charcoaling makes four zones likely areas for a briquetting plant in Georgia: (1) the zone around Toccoa, Cornelia, Clarkesville, Clayton, and Mountain City; (2) the zone around Savannah; (3) the zone between Brunswick and St. Marys; and (4) the zone from Cuthbert to Albany.

These areas, shown on the map following, are punctuated with hardwood stands, mills, and woodworking plants. They therefore represent a good source of raw materials for charcoaling, provided of course, that the price is low enough.

Completion of the wood residue survey now in progress will make it possible to further delineate suitable areas.

FOUR RECOMMENDED ZONES FOR A BRIQUETTING PLANT IN GEORGIA



CHARCOAL AND BRIQUETTES

Georgia's Timber Resources

Georgia has abundant raw material for charcoaling. About 64 per cent of its surface is forest land. The softwoods or conifers occupy roughly 37 per cent and the hardwoods or broadleaf trees about 27 per cent.

Charcoalers generally prefer the hardwoods. The reason for this preference is indicated in the next section. The use of hardwoods as such is not advisable, however, since for a charcoal manufacturer raw material costs must be as low as possible. This suggests at once the use of mill or woodworking industry residues as a source of raw material.

The cost of wood residues in the Southeast was reported to be $2.70 per cord in 1956--lower than anywhere in the country. This makes it a highly desirable raw material.

On the basis of available information four locations are recommended as suitable for a briquetting operation:

1. The zone around Toccoa, Cornelia, Clarkesville, Clayton, and Mountain City. This is a region with predominantly hardwoods, where a considerable number of sawmills and woodworking industries are concentrated. It should be possible to obtain hardwood residues at low prices and in considerable quantities. Toccoa, for example, has two large furniture manufacturers, a good size casket plant, some smaller furniture manufacturers and miscellaneous woodworking industries, plus two sawmills. Mountain City has the large Ritter Lumber Company sawmill and three smaller mills. Cornelia has about six smaller sawmills, in addition to the International Furniture Company and some eight other woodworking industries.

2. The zone around Savannah. Savannah has the large Reynolds and Manley Lumber Company sawmill, the Bradley Plywood Corporation, the Georgia Pacific Plywood Company, the Pierpont Manufacturing Company (boxes), some eight small sawmills and some 25 small to medium-sized woodworking industries. The Union Bag-Camp Paper Company, also in Savannah, reportedly has no residue available.

3. The zone between Brunswick and St. Marys. The Brunswick Pulp and Paper Company and the St. Marys Kraft Corporation are both situated in this area. There are also about seven small sawmills and five woodworking industries at Brunswick to supply wood residues.

4. The zone from Cuthbert to Albany. Both Randolph and Dougherty Counties have more hardwoods than pines; the neighboring counties of Terrell, Lee, Calhoun and Baker each offer more than three cords of hardwood cull timber per acre. Dougherty County has also more than three cords to the acre, while Randolph County has between two and three cords.

At Albany there are three small sawmills, one small plywood supplier, two large sawmills (Reynolds Brothers Lumber Company and Watkins Lumber Company, Incorporated), two small mill works, a medium-sized corrugated box manufacturer of hardwood cleats. At Cuthbert there are 12 small sawmills, one large sawmill (Burgin Lumber Company, Incorporated) as well as two medium-sized plywood and veneer manufacturers (Dulaney Veneer Company, Incorporated, and J. & J. Veneer Company, Incorporated).

At present the Georgia Forestry Commission and the Southeastern Forest Experiment Station are carrying out a survey to determine the amounts, types and costs of wood residues available at specific locations throughout the State. It is expected that the results will be made available at the end of the current year. They will add valuable information on the best locations, from the raw material point of view, for a charcoaling operation.

Charcoaling as a Means of Utilizing Hardwood Cull Trees

Charcoaling is an excellent way of utilizing cull hardwoods. The type of hardwood found in stands where pines prevail, as is the case in South Georgia, is mostly poor quality and includes much scrub oak. Such hardwood has no value to the lumberman because it cannot be used for furniture, plywood or construction purposes. Pulpmakers are showing some interest in hardwoods, but a complicating factor is that for most applications in this field they have to be debarked first. Charcoaling can use practically any kind of hardwood and debarking is not required when the charcoal is converted into briquettes. Small diameter material (below 10 inches) might cause some inconvenience because it decreases the amount of wood that can be charged in the kilns. Nevertheless, even small diameter wood can be used when the price is low enough.

There is, of course, a good supply of mill residue available in South Georgia. It will be mainly softwood, but it seems likely that a certain quantity of softwood, say up to 20 or 25 per cent, could be safely included in the briquettes without creating consumer resistance.

This consumer resistance to softwood briquettes is apparently based on the fact that a softwood briquette weighs less than a hardwood briquette of the same size. The result is that the consumer will notice that his softwood briquettes do not burn as long as those obtained from hardwoods. He is apt to forget that 10 pounds of softwood briquettes represents more briquettes than the same weight of hardwood.

Georgia Charcoal Producers

The following charcoal producers are listed for Georgia:

Cherokee Enterprises	Hogansville
Dixie Coal Company	Greensboro
Hagler, Ed	Augusta
High's Charcoal Company	Williamsburg
Moore, Arthur	Augusta
Renfroe, Rudolf	Thomasville
Talbrion Tree Farms	Geneva

It is estimated that the total Georgia charcoal production is about seven tons a day or about 2,100 tons a year. This is only 1/126 of the national (1956) production and surprisingly small for an important forest state like Georgia. Such production is hardly sufficient to keep one small briquetting plant going. This indicates that there is room for more charcoal production capacity in the State. To date, no briquetter has been reported in Georgia.

The Growing Charcoal Briquette Market

For a long time charcoal production in this country has been declining. From a peak figure of 554,785 tons in 1909 it dropped to a low of 213,660 tons in 1947. This seems to have been caused mainly by the use of other materials in the manufacture of metals and chemicals and the loss of heating and cooking markets.[1/] In recent years, however, production has been increasing again and reached 264,990 tons in 1956. This has been caused in great part by the increased briquette production for picnic and outdoor cooking use, which is offsetting the loss of other markets. Briquette production for 1956 has been given as about 125,000 tons. This represents an average per capita consumption of about 1.5 pounds.

Briquettes are a seasonal product, sold mainly in the late spring, summer and early fall. The demand for charcoal in the summer of 1955 was such that

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1/ "Charcoal Production in the U. S.," U. S. Department of Agriculture, July 1957, p. 2.

it exceeded the supply.[1/] Market figures obtained by a survey conducted by the Industrial Development Branch in seven communities in the Southeast, together with available published figures (see next section), indicate that per capita consumption is still increasing. This is confirmed by interviews with retailers and the great number of new briquetting plants. It is also confirmed by the fact that outdoor cooking is still gaining adherents, as indicated by the sales of related products.

The Local Briquette Market

In order to approximate the local briquette market, surveys were carried out in seven towns in Georgia, South Carolina, Alabama, and Florida to determine total 1957 sales there. This was done by visiting all retail outlets and local wholesalers in each of the cities surveyed. From these figures the approximate average per capita consumption was calculated. The exact way this was done is indicated in Appendix I. The results are:

1957 Consumption in Pounds Per Capita

Georgia	Domestic	Industrial	Total
Athens	1.8		1.8
Rome	1.6		1.6
Toccoa	2.3	0.8	3.1
South Carolina			
Aiken	1.1		1.1
Orangeburg	0.7		0.7
Alabama			
Dothan	1.8		1.8
Florida			
Tallahassee	2.5		2.5

This gives an average figure for the northern part of Georgia of about 1.8 pounds per capita. Assuming that the southern part of Georgia will show figures comparable to the Dothan and Tallahassee figures, its average yearly per capita consumption is estimated to be 2.2 pounds. For the whole of Georgia an approximate figure of 2.0 pounds per capita seems conservative, since the Atlanta area likely would be the heaviest user in the State.[2/] A figure

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1/ "Review of Chemical Utilization," Forest Products Journal, February 1956, pp. 63-66.

2/ Atlanta was not surveyed because of the inordinate cost which would have been involved in contacting the large number of outlets.

of 1.8 pounds per capita will be used for Alabama, 2.4 for Florida and 1.0 for South Carolina. Tennessee and North Carolina are estimated to consume about the same amount as North Georgia, or about 1.8 pounds per capita. These figures check with the few available published data.[1/]

In 1956 the total briquette consumption of the country was approximately 125,000 tons. This gives a per capita consumption for 1956 of about 1.5 pounds. If the 1954 and 1955 figures of 0.7 and 1.2 are representative, the rapid growth of the charcoal briquette market can be seen.

On the basis of these survey figures an estimate can be made of total 1957 sales in Georgia and those neighboring states which can be considered a market for a Georgia producer, as follows:

Georgia	2 x 3,772,000	=	7,544,000 lbs.
Alabama	1.8 x 3,095,000	=	5,571,000 lbs.
Florida	2.4 x 3,794,000	=	9,106,000 lbs.
North Carolina	1.8 x 4,326,000	=	7,787,000 lbs.
South Carolina	1 x 2,275,000	=	2,275,000 lbs.
Tennessee	1.8 x 3,400,000	=	6,800,000 lbs.
	Total		39,083,000 lbs.

At the present time there exists one very small producer in Alabama, one large producer in Florida, one in North Carolina and two in Tennessee. (See section on "The Competitive Situation.") Given the small number of manufacturers in the area, an active Georgia producer could reasonably expect to capture one-sixth of this market. This would be roughly 6,500,000 pounds per year or, in round figures, 3,000 tons per year.

One Atlanta wholesaler estimated the Atlanta charcoal briquette sales at around 1,525 tons per year and those for North Georgia at about 425 tons per year, or a total of 1,950 tons per year for North Georgia, including Atlanta. This would give a figure of about 3,500 to 3,800 tons per year for Georgia as a whole, which approximates the survey estimate.

It is likely that the market will expand still further. How much it is extremely difficult to forecast, but 20 per cent seems a conservative figure.

1/ Surveys carried out in 1954 and 1955 in Wausau, Wisconsin, produced per capita figures of 0.7 pounds per capita for 1954 and 1.2 pounds per capita for 1955. (The figures given here are different from those in the original publication, because the published figures have been re-calculated according to the method outlined in Appendix I.)

This would represent an additional 3,900 tons per year for the six-state market area.

Another interesting fact is that there is some industrial use of briquettes. In one of the towns surveyed two roofing companies use charcoal briquettes; together they consume six tons per year.

The Competitive Situation

At present a large number of charcoal briquette brands are on the market. Those encountered in the survey are:

Brand	Manufacturer	Location
E-Z Lite	Cabot Carbon Co.	Gainesville, Florida
--	Coosa Charcoal Co.	Rockford, Alabama
Charkets	Tennessee Products	Nashville, Tennessee
--	Forest Products Chem. Co.	Memphis, Tennessee
Black Panther	Standard Milling Co.	North Carolina
Kingsford	Kingsford Chem. Co.	Iron Mountain, Mich.
Red Hot	Standard Milling Co.	Kansas, Missouri
Presto	--	St. Louis, Missouri
Hickory Pellets	Hinderer	Missouri
--	Burnside	Cumberland, Kentucky

The first five are southeastern producers, forming part of the six-state unit.

The Kingsford product originally had important sales in the South. A large part of it is distributed through Ford dealers. This somewhat peculiar set-up came about because the Ford Motor Company sold its wood distillation plant (which produces charcoal) to the Kingsford Chemical Company. In several towns the Ford dealers have been giving up this line, however. The higher transportation costs are a primary reason since the motor freight for charcoal is $20 per ton from Michigan to Atlanta. Local producers can therefore offer briquettes cheaper, which forces the retail price of Kingsford briquettes down. This in turn reduces retailer profit, which makes sales unattractive. Transportation costs from Gainesville, Florida, were given as $10 per ton, from Nashville, Tennessee, $12 per ton. A difference of $10 per ton transportation cost makes a difference of $0.05 for the 10-pound bag.

The Cabot Carbon Company at Gainesville, Florida is part of a large combine. It is claimed that they produce their briquettes from softwood. This seems to create some consumer resistance, as explained in a proceeding section.

The Coosa Charcoal Company of Alabama is small and apparently is not interested in expanding its operations. It sells to a large chain of supermarkets. One of the Tennessee producers now has an estimated capacity of 300 tons per month, having started out with a capacity of 150 tons per month.

All these companies offer their briquettes in 5, 10 and 20 or 25-pound bags. There are also some 40-pound bags. Based on figures provided by retailers and a few wholesalers it is estimated that a 10,000-pound lot is sold (to domestic consumers) as follows:

In 5 pound bags	2,700 pounds
In 10 pound bags	4,900 pounds
In 20 pound bags	2,400 pounds
Total	10,000 pounds

In other words, the number of 5-pound bags sold is roughly equal to the number of 20-pound bags. The total quantity of briquettes sold in 10-pound bags is approximately equal to the total quantity sold in 5 and 20-pound bags.

The lowest price found for a 10-pound bag was $0.69. That was the Black Panther Brand, produced in North Carolina and found in both South Carolina towns surveyed. Kingsford 10-pound bags are sold by Atlanta supermarkets for $0.89. The highest price for a 10-pound bag is about $1.00.

The Quaker Oats Company is now entering the charcoal briquette field also. Apparently they charcoal the cobs and hulls which have been treated with diluted sulfuric acid for furfural extraction. Their briquettes have the shape of a small, dented disc or wheel. It is difficult to predict what influence their product is going to have on the southeastern market.

Retail Outlets

At present the most important retail outlet for charcoal briquettes is the supermarkets. They handle an estimated 60 to 65 per cent of the total retail sales. The only other important outlets are some Ford dealers. As already mentioned, Ford dealers are apparently pulling out of charcoal briquette sales.

Department stores, variety stores, and hardware stores handle only nominal quantities of briquettes. This applies also to sporting and automotive supply stores. They are more interested in the sales of grills and other outdoor utensils. A buyer of the latter buys some briquettes at the same time, but repeat sales of briquettes are made for the most part at the supermarkets.

The retail sales picture varies from town to town. In most towns the supermarkets predominate, but in one the fuel dealer was the leading supplier and in two others service stations ranked number one.

Economics of Charcoaling[1/]

Briquetting can be very profitable if charcoal is obtained at a low price. Briquetting gives a satisfactory profit at a charcoal cost of $40 per ton; at $50 per ton the return is small.

Charcoaling in turn can only be done cheaply when the raw material, wood, is supplied at low cost. Low-cost residues or cull wood must be used. The latter possibility exists in the South Georgia area where hardwood has to be removed in order to get space for planting the pines preferred by the paper mills. In the first section it has been explained that a considerable part of the hardwoods of the South Georgia area is of low quality and of no value to lumbermen. It should therefore be possible to work out an arrangement with paper mills (or those who supply the mills with wood) whereby they would supply the charcoalers with hardwood at low cost. This would provide a cheap way to remove unwanted hardwood.

It is not possible to make a precise calculation of charcoaling costs, mainly because labor costs for large, efficiently operated kiln batteries are not available. Witherow and Smith[2/] give labor costs as $23.35 to $26.12 per ton of charcoal produced, but these are figures obtained on small experimental kilns. Labor costs reported in "Charcoal Production and Uses,"[3/] recalculated on a tonnage basis, give a figure of about $15 per ton. This figure again is

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1/ Many briquetting plants do not produce their own charcoal but buy it from others. The economics of briquetting and charcoaling are therefore presented separately.

2/ Witherow, Boyd M. and Smith, Walton R., "Cost of Operation for Three Types of Charcoal Kilns," Southeastern Forest Experiment Station, June, 1957.

3/ Northeastern Wood Utilization Council, January, 1957, p. 25.

based on operation of a battery of only four small kilns. The figure in "Charcoal Survey,"[1/] is about $15 per ton, also for a battery of only four small kilns. (Wood hauling is included in wood price, and bagging is unnecessary).

On the basis of these somewhat conflicting figures a figure of about $15 per ton for a large, efficiently run battery of kilns with staggered operation would likely not be too low. From this figure the price at which wood for the charcoaling operation would give a profit can be calculated.

A charcoal kiln of the type in use at the Athens-Macon Research Center of the Southeastern Experiment Station at Athens, with a capacity of about seven cords of wood, costs approximately $1,400. Such a kiln produces about 3.2 tons of charcoal per week or 150 tons per year. About twenty-seven kilns would therefore be needed to produce 4,000 tons of charcoal per year[2/] with 30 able to provide spare capacity. This battery would cost $42,000. With a truck, a mechanical shovel for loading and unloading the kiln, some land and land improvement, capital outlay would total approximately $50,000.

The average life of these kilns is estimated at four years. Operating costs would therefore be broken down as follows:

1.	Amortization ($50,000 in four years)		$ 12,500
2.	Wages (4,000 tons at $15 per ton)		60,000
3.	Manager's salary		7,500
4.	Repairs and maintenance		1,000
	Sub total		$ 81,000
5.	Taxes, insurance:		
	Property taxes	$ 1,000	
	Insurance	500	1,500
	Total		$ 82,500
	Contingencies (10% of total)		8,250
	Total operating costs		$ 90,750
	15% return on fixed investment		7,500
	Total charcoaling costs (minus raw material)		$ 98,250
	Cost per ton	$24.60	

Subtracting this production cost of $24.60 from the $40 per ton figure given above for charcoal, $15.40 remains for the cost of wood. This gives a figure

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1/ University of Arkansas, November, 1956, p. 87.

2/ The next section explains why 4,000 tons per year was taken as a basis for the calculation.

of $7.00 per cord--somewhat low compared with the $7.90 which charcoalers pay for roundwood in the Southeast, but high compared with the $2.70 per cord paid for residues.

The above figures indicate that it should be possible to obtain hardwood culls in South Georgia at a price equal to or perhaps even lower than the $7.00 calculated here. Furthermore it might be possible to include up to 20 or 25 per cent of softwood residues in the charcoal without meeting any consumer resistance.

Lately charcoal has been produced in retorts without recovery of by-products. These retorts permit continuous operation, which reduces labor requirements. Cost data on a particular type, the Conchar retort, have been published in the University of Arkansas' "Charcoal Survey." These do not include profits or contingencies. Adding those in the same way as done above the charcoal would cost $39.90 at a raw material price of $7.50 per cord. At a price of $7.00 per cord this would result in charcoal cost of $38.90 per ton or about $1.00 lower than the kilns. However, in the Arkansas study the fixed investment is depreciated in 10 years. It seems questionable that the retorts will last that long.

The problem of which charcoaling method should be used would in any case be better postponed until it has been determined where and in what quantities the cull hardwoods are available. Without this information it cannot be determined whether it will be better to have one large battery of kilns or retorts of a stationary nature, or whether scattered smaller units of a portable nature would be preferable. The Conchar retorts are transportable; kilns of a portable nature are also available.

Economics of a Local Briquetting Plant

The smallest economic size briquetting plant would have a capacity of about one ton per hour or 8 to 10 tons per day. The cost of such a plant is given by one source as $80,000 and another as $100,000. The larger figure seems high; however, it will be used to provide a conservative estimate.

A new plant would probably start at a reduced capacity. Its eventual normal production is estimated to be 4,000 tons per year. Since this figure includes the estimated increase in consumption for 1958, it will be used as the basis for a profitability calculation. In order to keep accounting simple, it is further assumed that the briquettes are sold in 10-pound bags.

Plant investment (briquetting plant) (Total cost of installed equipment, foundations, platforms, supports)	$100,000
Building, land, land improvements (building will be a simple shed)	10,000
Total fixed investment	$110,000

Again, to be conservative, the fixed investment is amortized in five years. The calculation then will be:

Annual Mill Costs

1.	Amortization $110,000 in 5 years		$ 22,000
2.	Raw materials		193,280
	4,000 tons of charcoal at $40 per ton	$160,000	
	Starch (estimate)	12,000	
	800,000 paper bags at $26.60 per 1,000	21,280	
	Sub-total		$215,280
3.	Wages and salaries		35,000
	4 men at $1.00 per hour	$ 16,000	
	1 foreman	5,000	
	1 administrative employee	5,000	
	1 manager-technician	9,000	
4.	Power		2,500
5.	Repairs and maintenance		4,500
6.	Operating supplies		750
7.	Taxes, insurance		3,300
	Property taxes	$ 2,200	
	Insurance	1,100	
	Total		$261,330
	Contingencies (10% of total)		26,130
	Total Annual Mill Costs		$287,460

For a profitability calculation it is assumed that the retail price for 10-pound bags is $0.69 (the lowest found so far). Jobber and retailer profits are assumed to be 20 per cent. It is further assumed that transportation costs to the jobber will be $7 per ton and that the briquetting plant buys its raw charcoal at $40 per ton. Using the low retail price of $0.69 per 10 pounds and assuming total retail sales of 8,000,000 pounds the following profitability calculation is made:

Total retail sales	$ 552,000	
Retailer's mark-up (20%)	92,000	
Remainder	460,000	
Jobber's mark-up (20%)	76,667	
Remainder	383,333	
Transportation costs (producer to wholesaler, 4,000 tons at $7.00 per ton)	28,000	
Remainder	355,333	
Annual mill cost	287,460	
Profit	67,873	
Return on fixed investment (before taxes)		61.7%
Working capital, say $80,000		
Return on total investment (before taxes)		35.7%

In studying these figures it must be remembered that they were calculated on the basis of the very lowest retail price found. For this reason the cost of paper bags is for those with outside brown paper (printed in two colors), which are cheaper than those with outside white paper. The somewhat low retailer mark-up is based on the fact that a large amount of charcoal is sold through the supermarkets, which take less profit. An uncertainty in the calculation is the starch cost.[1/]

It has been assumed that the manager and the administrative employees will take care of contacts with and selling to the jobbers. It might be that a travelling salesman would have to be used, perhaps on a part-time basis. This would of course, decrease profits slightly. However, from these conservative figures it is apparent that an efficiently run Georgia briquetting operation should prove quite profitable.

1/ In the "Charcoal Survey" published by the University of Arkansas, November, 1956, a cost of about $1.00 per ton is indicated. To allow for contingencies, we have used approximately $3.00 per ton.

APPENDIX I

Calculation of the Yearly Per Capita Consumption of Charcoal Briquettes from Retail Sales Figures

In order to determine the market for charcoal briquettes, seven medium-sized towns were sampled in Georgia, Alabama, Florida, and South Carolina. In these towns all retail outlets for briquettes were visited in order to obtain 1957 sales figures. (1956 figures could not be obtained.) Adding all these figures, an approximate figure for total 1957 sales in each town was obtained.

Since a certain percentage of the rural population shops at the city's shopping centers, merely dividing total yearly sales by city population does not give an accurate estimate of per capita consumption. A more realistic market community is represented by the expression:

$$\text{City population} + \frac{\text{County population - city population}}{2}$$

Another method is to increase the retail sales figure for the city (for the product studied) in the proportion of total retail sales of the county to total retail sales of the town. This gives retail sales for the whole county. This figure is divided by the county population to arrive at per capita consumption. This assumes, of course, that county residents shop in their own counties.

$$\frac{\frac{\text{County retail sales}}{\text{City retail sales}} \times \text{Briquette sales in city}}{\text{County population}}$$

Both methods were applied. It was found that for counties where the county center contained about half the population or less, the figures resulting from the two methods of calculation agreed very well. For counties where the greater part of the population is concentrated in the county center, the retail sales proportion method figure was somewhat lower than the figure derived according to the half of the difference method. In other words, in these cases apparently more than half of the rural population shopped at the town. This was to be expected.

The per capita consumption figures reported on page 8 were calculated according to the retail sales proportion method. In case the total retail sales figure for the town was not available (for instance, in Toccoa, Georgia), the figure calculated according to the half the difference method was corrected on the basis of figures obtained by the two methods for counties with similar population distribution characteristics.

APPENDIX II

Manufacturers of Briquetting Equipment

Vulcan Iron Works	700 South Main Street Wilkes-Barre, Pennsylvania
Komarek-Greaves & Company	2491 North Mozart Street Chicago 18, Illinois

There is also an extrusion-type briquetting press on the market, the "Glomera," reported in "Charcoal Survey," University of Arkansas, November, 1956. The manufacturer of this press is not known.